REMARKS

The Examiner has rejected Claims 1-3, 5-6, 8, 16 and 17 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740). Applicant respectfully disagrees with such rejection.

With respect to independent Claims 1, 16, and 17, the Examiner has relied on Col. 3, lines 4-6 from Aleksic, in addition to Col. 1, lines 55-57 and Col. 6, lines 15-50 from Cosman, to make a prior art showing of applicant's claimed technique "wherein the modifying is based on a depth-component of the algorithm."

Specifically, the Examiner has argued that "Aleksic... teaches modifying is based on the normal shading component." In addition, the Examiner has argued that "Cosman teaches [calculating] angular tilts U and V from the values in [a] height map and stored in bump angle memory," that "the angular tilt of the bump map is considered...equivalent to the normal vector as both the angular tilt and the normal vector represents the curvature of the bump map," and that "[the] height map is the functional equivalent of a depth map." The Examiner has further argued that "therefore, Cosman teaches [deriving] the normal vector from the depth map (depth component)," that "Aleksic already teaches that modifying is based on the normal vector," and that "[the] values of [the] height map correspon[d] to the depth value."

Applicant respectfully disagrees and notes that the above excerpts relied on by the Examiner merely teach that "[t]he bump-shading component (ΔN•L) is then combined with the normal shading component (N•L) to produce the shading function for the given pixel" (Aleksic, Col. 3, lines 4-6). The excerpts further teach that '[t]o create the illusion of bumps, a bump texture map contains values for each texel, that define the local "tip" or "tilt" which is applied to the instantaneous surface normal' (Cosman, Col, 1, lines 55-57).

Additionally, the excerpts teach that "the bump curvature values are related to the largest absolute difference in the tilt values of the surrounding texels which in turn is

related to the absolute height values of the bump map," and that "the angular tilts U and V are calculated by the angle processor 42 from the values in the height map 40 and stored in bump angle memory 44" (Cosman, Col, 6, lines 23-38).

Thus, as noted above, Aleksic only discloses that the bump-shading component (ΔN•L) is combined with the normal shading component (N•L), which does not suggest that the normal shading component of Aleksic is the same as the angular tilts of Cosman, as suggested by the Examiner. Thus, merely disclosing that angular tilts are calculated by the angle processor from the values in the height map, in addition to disclosing that a bump-shading component is combined with a normal shading component to produce a shading function for a given pixel, fails to teach a technique "wherein the modifying is based on a depth-component of the algorithm" (emphasis added), as claimed.

In the Office Action dated 04/08/2008, the Examiner has merely reiterated their previous arguments and has further argued that "Aleksic teaches modifying a value (x) (N summed with ΔN produces a resulting vector N + ΔN, which is perpendicular to the bumped surface) based on an algorithm (addition corresponds to algorithm)," and has further argued that "modifying is based on the normal shading component [as shown in] col. 1, lines 52-57, col. 3 lines 4-6... col. 4 lines 1-35, col. 6 lines 25-32, col. 10 lines 2-19." Further still, the Examiner has argued that "it should be noted that [a] normal shading component is a product of a normal vector of a[n] object and a light vector" and that "when vector N + ΔN is multiplied with the light vector L, it results in the desired shading function for this... particular pixel location and thus determine[s] bump mapping pixel-by-pixel" in addition to arguing that "the display value of a pixel is thus determined using the bump-shading component and a normal shading component, which includes a normal vector."

Applicant respectfully disagrees and notes that the above excerpts from Aleksic relied on by the Examiner merely disclose that "[t]he bumping process... begins by determining a normal vector (N) of the object, where the normal vector is perpendicular to the planer surface of the object" (Col. 1, lines 53-57 – emphasis added). Additionally,

the excerpts teach that "[t]he bump-shading component (ΔN•L) is... combined with the normal shading component (N•L) to produce the shading function for the given pixel" (Col. 3, lines 4-6 – emphasis added). Further, the excerpts disclose that "[t]he combining circuit 30 receives the color information 46, the texel information 48 and the bump intensity value 44," that "the combining circuit 30 receives a normal shading function (N•L) and combines the normal shading function with the bump intensity value 44 to obtain a resulting shading function (N•L)+(ΔN•L)," and that "[t]he combining circuit 30 then combines the resulting shading function with the color information 46, and the texel information 48 to produce display data 50 for a given pixel" (Col. 4, lines 22-30 – emphasis added).

Further still, the excerpts disclose that "[t]he first computing module 121 receives a light vector L, which represents the vector of at least one light source relating to the graphical images to be displayed" as well as "an object vector N, which represents the normal vector of the object being rendered," and that "[t]he first computing module 121 combines the vectors to produce a normal shading function 156 (N•L)" (Col. 6, lines 25-32 – emphasis added). Also, the excerpts teach that "the normalized vector N of the object is summed with the ΔN vector of the bump surface to produce the resulting vector N+ΔN," that "[t]he resulting vector is perpendicular to the bumped surface," and that '[b]y performing a dot product with the light vector L and the resulting vector N+ΔN produces the desired shadowing function for this particular pixel location" (Col. 10, lines 10-15).

However, merely determining a normal vector for an object, combining a bump-shading component with a normal shading component to produce a shading function for a given pixel, combining a shading function with a bump intensity value to obtain a resulting shading function, combining light and object vectors to produce a normal shading function, and summing a normalized vector with a ΔN vector of the bump surface to produce a resulting vector, as in Aleksic, does not suggest that the normal shading component of Aleksic is the same as the angular tilts of Cosman, as suggested by the Examiner. Therefore, the above excerpt language, in addition to calculating angular

tilts by an angle processor from the values in the height map, as in Cosman, fails to teach a technique "wherein the modifying is based on a depth-component of the algorithm" (emphasis added), as claimed by applicant.

Additionally, with respect to independent Claim 5, the Examiner has relied on Col. 3, lines 4-6 from Aleksic, in addition to Col. 1, lines 55-57 and Col. 6, lines 15-67, Col. 9, lines 6-15 and 35-67, and Col. 10, lines 1-54 from Cosman to make a prior art showing of applicant's claimed technique "wherein the modifying allows a lighting operation to display an interaction of displayed objects."

Specifically, the Examiner has reiterated the above noted arguments in addition to arguing that the "wave bump map and ocean correspon[d] to displayed objects," and that "raising the brightness of the scene to overall average brightness to compensate for the brightness decrease in areas near the specular highlight corresponds to applying a lighting operation."

Applicant respectfully disagrees. As noted above, Col. 3, lines 4-6 in Aleksic, in addition to Col. 1, lines 55-57 and Col. 6, lines 15-67 in Cosman, merely disclose that angular tilts are calculated by the angle processor from the values in the height map, and that a bump-shading component is combined with a normal shading component to produce a shading function for a given pixel. Clearly, such excerpts do not even suggest that "the modifying allows a lighting operation to display an interaction of displayed objects" (emphasis added), as claimed.

Additionally, the above excerpts relied on by the Examiner merely teach that "[t]o compensate for the brightness decrease in areas near the specular highlight a complementary computation is needed to raise the brightness of the scene to an overall average brightness that is believable" (Cosman, Col. 9, lines 12-15). Further, the excerpts teach "a wave bump map on a simulated ocean" and that "[w]here the bumps exist, the modeler can tune the coefficients so that the average brightness of the ocean within the specular area is correct" (Col. 9, lines 53-56).

However, merely disclosing that a complementary computation is needed to raise the brightness of a scene to an overall average brightness, in addition to disclosing a wave bump map and tuning coefficients where the bumps exist, fails to even *suggest* a technique "wherein the modifying allows a lighting operation to display an interaction of displayed objects" (emphasis added), as claimed by applicant.

In the Office Action dated 04/08/2008, the Examiner has merely reiterated their previous arguments and has further argued that the "wave bump map on a simulated ocean corresponds to the interacti[on] of displayed objects" and that "it should be noted that the actual modification values stored within a polygon to increase the brightness of areas surrounding the highlight will depend on the nature of the bump map."

Applicant respectfully disagrees and notes that Cosman merely discloses that "the actual modification values stored within a polygon to increase the brightness of areas surrounding the highlight will depend on the nature of the bump map" (Col. 9, lines 40-43). Further, Cosman discloses "a wave bump map on a simulated ocean" and that "[w]here the bumps exist, the modeler can tune the coefficients so that the average brightness of the ocean within the specular area is correct" (Col. 9, lines 53-56).

However, merely disclosing that a complementary computation is needed to raise the brightness of a scene to an overall average brightness, where modification values to increase the brightness of areas surrounding the highlight depend on the nature of the bump map, in addition to disclosing a wave bump map as well as the tuning of coefficients where the bumps exist, as in Cosman, fails to even *suggest* a technique "wherein the modifying allows a lighting operation to display an interaction of displayed objects" (emphasis added), in the context claimed by applicant.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the

reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck,*947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir.1991).

Applicant respectfully asserts that at least the third element of the *prima facie* case of obviousness has not been met, since the prior art references, as relied upon by the Examiner, fail to teach or suggest all of the claim limitations, as noted above. A notice of allowance or a proper prior art showing of all of applicant's claim limitations, in combination with the remaining claim elements, is respectfully requested.

Applicant further notes that the prior art is also deficient with respect to the dependent claims. With respect to Claims 14 and 15, the Examiner has rejected the same under 35 U.S.C. 103(a) as being unpatentable over Aleksic, in view of Cosman, in view of Demers et al. (U.S. Patent No. 6,700,586), and further in view of Jenkins (U.S. Patent No. 6,028,608). Specifically, the Examiner has relied on Col. 53, lines 56-67; and Col. 54, line 38 from the Jenkins reference to make a prior art showing of applicant's claimed techniques "wherein y equals three (3)" (see Claim 14) and "wherein y equals four (4)" (see Claim 15). Further, the Examiner has argued that "Jenkins teaches a case when [the] viewpoint motion vector is parallel to [the] view direction vector, object space x and y values are constant while [the] z value varies."

Applicant respectfully disagrees and notes that the above excerpts relied on by the Examiner merely teach a "case of viewpoint motion with a constant view direction vector" (Col. 53, lines 56-57) and a "transform [of] x and y object-space values" (Col. 54, lines 37-38). However, nowhere in the cited excerpts is a technique taught "wherein y equals three (3)" (see Claim 14) and "wherein y equals four (4)" (see Claim 15), especially where "X includes ($n \bullet \mathbf{T}_{proj}[y]$)" and "where $\mathbf{T}_{proj}[y]$ includes the projection transform" (see Claim 13), in the context claimed.

In the Office Action dated 04/08/2008, the Examiner has merely reiterated their previous arguments in addition to previous arguments concerning dependent Claims 12 and 13, and has further argued that "the dot product calculation between the normals and the matrix corresponds to ($n*T_{proj}[y]$), which further implies that X includes the dot product calculation between the normals and the matrix" and that "it should be noted [that] although the reference does not use the same terminology as the claimed invention, the functional equivalents of the related terms [have] been suggested by the examiner." Further, the Examiner has argued that "by y = 3 and y = 4, the examiner interprets [that] the value of y stays constant during the transformation process."

Applicant respectfully disagrees and again notes that the above excerpts relied on by the Examiner merely teach a "case of viewpoint motion with a constant view direction vector" (Col. 53, lines 56-57) and a "transform [of] x and y object-space values" (Col. 54, lines 37-38). However, nowhere in the cited excerpts is a technique taught "wherein y equals three (3)" (see Claim 14) and "wherein y equals four (4)" (see Claim 15), especially where "X includes ($n \bullet \mathbf{T}_{proj}[y]$)" and "where $\mathbf{T}_{proj}[y]$ includes the projection transform" (see Claim 13), in the context claimed.

Again, since at least the third element of the *prima facie* case of obviousness has not been met, a notice of allowance or specific prior art showing of each of the foregoing claim elements, in combination with the remaining claimed features, is respectfully requested.

To this end, all of the independent claims are deemed allowable. Moreover, the remaining dependent claims are further deemed allowable, in view of their dependence on such independent claims.

In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 505-5100. The

Commissioner is authorized to charge any additional fees or credit any overpayment to Deposit Account No. 50-1351 (Order No. NVIDP015A).

Respectfully submitted,
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